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Ecstasy use among college undergraduates: gender, race and sexual identity

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Abstract

We examined a random sample ($N = 3606$) of undergraduates at one large midwestern university and explored correlates of ecstasy use and how use varied by gender, race, and sexual identity. Approximately 10% of the sample used ecstasy in their lifetime; 7% had used within the past year and 3% within the past month. Ecstasy was the second most likely illicit drug to be used, marijuana being the first. Multivariate logistic regression indicated that while men and women were equally likely to have used ecstasy, excessive partying, sexual identity, and grade point average were strongly correlated with ecstasy use. After adjusting for several factors, the number of sexual partners increased the likelihood of ecstasy use, as did self-reported sexual identity; gay, lesbian, and bisexual students were more than two times as likely to have used ecstasy in the past year. Significant relationships existed between ecstasy use and other substance use such as binge drinking, marijuana use, and cigarette smoking. Implications for interventions are discussed.

Keywords: Ecstasy; Undergraduates; Gender; Race; Sexual identity

1. Introduction

Recent evidence suggests that the use of the synthetic compound, 3,4 methylenedioxymethamphetamine (MDMA), a "club drug" also known as "ecstasy," has become progressively more prevalent among adolescents and young adults in the United States and may be second only to marijuana as the most frequently used illicit drug among young adults (Johnston, O'Malley, & Bachman, 2001a; Pope, Ionescu-Pioggia, & Pope, 2001). Possessing stimulant and hallucinogenic properties, the popularity of ecstasy has been attributed to the euphoric-like effects that users experience, including feelings of intimacy and positive mood; researchers have also noted increased feelings of enhanced sexual desire (Zemishlany, Aizenberg, & Weizman, 2001). However, ecstasy use also leads to negative consequences, including short-term acute effects (i.e. flashbacks, anxiety, confusion, depression) and long-term toxicity (Boot, McGregor, & Hall, 2000; Morgan, 2000). An amphetamine analog with sympathomimetic properties, symptoms of toxic reaction to ecstasy include tachycardia, sweating and hyperthermia (see Teter & Guthrie, 2001, for a more complete review); not surprising given its increased popularity, the Drug Abuse Warning Network noted that emergency department episodes significantly increased ($p < .01$) from 250 mentions in 1994 to 2450 mentions in 1999. Of particular concern is the elevated rate of ecstasy use among sub-groups of young people (Conner & Sherlock, 1998; Johnston, O'Malley & Bachman, 2001b; Pope et al., 2001). Although previous research generally has been limited to descriptions of suburban, white, young adult populations, more recent studies have identified possible "hidden populations" of ecstasy users, including those reporting homosexual activity (Pope et al., 2001) and some ethnic minority groups (Johnston et al., 2001b; Strote, Lee, & Wechsler, 2002). These studies have shown that ecstasy use, as well as the motivations, harms, and risks associated with use, may vary across populations. However, very few studies have systematically examined sexual or gender differences, including ecstasy use by sexual identity.

Strote and colleagues (2002) examined the prevalence and changing patterns of ecstasy use among college students in

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1999. In this longitudinal study, 140 colleges in 1993 were contacted in order to establish an initial sample; for their 1999 sample, the original 140 schools were included if the school had at least a 50% response rate for the 1993 and 1997 studies and 40% for the 1999 survey. Thus, 119 schools provided the student lists for the 1999 sample. Using data from 1997 and 1999 in order to document trends, these researchers used a nationally representative sample of over 14,000 college students from the 119 four-year colleges. The samples in 1997 and 1999 were similar on many dimensions; three out of five respondents were women (60% in 1997; 61% in 1999) and about 3 out of 4 respondents were white. Forty-four percent of the schools were reported as large (over 10,000 students) while 34% were small (5000 students or fewer). These researchers found that annual ecstasy use rose from 2.8% to 4.7% between 1997 and 1999, a statistically significant increase; however, this rise in ecstasy use was not universal. Among minority groups, students older than 24 years, married students, and residents in fraternities and sororities, there were no significant changes in ecstasy use. There were several student groups that experienced an increase in use between 1997 and 1999: Asian students, sophomores, and students under 21 years old. Data revealed that ecstasy users were more likely to engage in several risky behaviors such as sexual activity, marijuana use, binge drinking, and cigarette smoking. There were, however, several limitations to the study conducted by Strote and colleagues. Most notably, these authors did not report the influence of factors that have been shown to be correlated with drug use such as sexual identity, educational status of parents, and high school ecstasy use.

1.1. Statement of purpose

Toward gaining a better understanding of the relationships among ecstasy use and gender, race and sexual identity, we examined these variables–as possible correlates of ecstasy use–along with grade point average, parent's educational level, and living arrangement. Secondarily and in order to create a more complete picture of ecstasy use by undergraduates, we also examined the association between ecstasy use and several risky behaviors including binge drinking, marijuana use, cigarette smoking and number of sexual partners.

1.2. Research questions

Using a large 2001 random sample of undergraduate students from the University of Michigan, we asked the following:

- Are women more likely to use ecstasy than men?
- Are white students more likely to use ecstasy than students of color?
- Are gay, lesbian and bisexual students more likely to use ecstasy than students who self-identify as heterosexual?

2. Materials and methods

2.1. Procedure

The present study was fielded for a 1-month period during March and April of 2001 and at that time, the total undergraduate population at the University of Michigan was 21,055 full-time students (10,732 women and 10,323 men). Probability sampling was feasible because a complete frame of all undergraduate students was available from the university's Registrar Office and thus, a random sample of 7,000 full-time undergraduate students was selected from the population of enrolled students. The Registrar Office provided the list of electronic (e-mail) addresses, mailing addresses, gender, class year, race and other important demographic information for all 7,000 students. The 7,000 students were randomly assigned to either the web mode (n = 3,500) or US mail mode (n = 3,500) of survey administration. After completing the survey, students were given a $10.00 gift certificate to a local bookstore. The University of Michigan's Institutional Review Board approved the study protocols and each participant provided informed consent.

Several strategies were used to insure confidentiality. First, a research firm that was unaffiliated with the university was contracted to set up the website as well as to store and maintain data from both modes of data collection, including US mail paper surveys. Thus, the researchers, affiliated with the University were unable to access the names, e-mail addresses or data of any respondents. The data file containing the respondent's identifying information was stored in a password-protected location at the independent research firm. Second, the web survey was maintained on a hosted secure Internet site running under the secure socket layer protocol and the respondent's data could not be matched to the respondent's identifying information. Finally, all respondents were sent information making it clear that participation was voluntary, explaining the relevance of the study and that responses were kept confidential.

2.2. Survey instrument

The 2001 Student Life Survey questionnaire, developed by researchers at the University of Michigan, was used in the present study. The survey questionnaire draws from several instruments including previously tested items and scales measuring several student life characteristics and behaviors, including alcohol and other drug use (Johnston et al., 2000; Presley, Meilman & Cashin, 1996; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). The instrument was pretested in a paper version in 1993 and in a web version in 1999.

2.3. Measurement

Monthly marijuana use was assessed using the following question: ''On how many occasions have you used

marijuana in the past 30 days?" Seven response choices were provided: (1) None, (2) 1–2 occasions, (3) 3–5 occasions, (4) 6–9 occasions, (5) 10–19 occasions, (6) 20–39 occasions, (7) 40 or more occasions (Johnston et al., 2000).

Cigarette use per day was measured using the following question: "How many cigarettes did you smoke during the past 30 days?" The response categories were: (1) none, (2) less that one cigarette per day, (3) one to five cigarettes per day, (4) about half a pack per day, (5) about one pack per day, (6) about one and a half packs per day, and (7) two or more packs per day (Johnston et al., 2000).

Other measures of alcohol and other drug use that were consistent with past research included: Drinks per week (Presley et al., 1996), binge drinking in the past two weeks (Wechsler et al., 1994), ecstasy use in lifetime, past 12 months and past 30 days (Johnston et al., 2000; Wechsler et al., 1994), and alcohol use in the past 30 days (Johnston et al., 2000).

2.4. Sample

As illustrated in Table 1, the sample included 3606 students: 1497 men and 2109 women. The response rate for the web mode was 63% and the US mail mode was 40%; this resulted in a final overall response rate of 52% (3,606/7,000).

Overall, the final samples within each mode appeared to be fairly representative of the target sample although gender distribution was significantly different between survey modes ($\chi^2 = 15.7$, $df = 1$, $p < .001$), with less representative proportions occurring in the US mail group. There were no significant differences in the distributions of race, class year, academic credit hours, and age between the two survey modes. For a more in-depth discussion of issues related to response and mode with this sample, see McCabe, Boyd, Couper, Crawford, & d'Arcy (2002).

Table 1
Lifetime ecstasy use and time of first use, by student characteristics

Student characteristic	*n*	% used	χ^2 *p*-value	Of users, % initiating in HS*	χ^2 *p*-value
Sex					
Male	1497	11	.685	21	.130
Female	2109	10		28	
Race					
White	2448	11	.005	26	.533
Asian	443	7		16	
African American	179	4		14	
Other	536	10		28	
Class year					
Freshman	629	7	.002	70	<.001
Sophomore	862	9		36	
Junior	954	10		19	
Senior	1149	13		11	
Living arrangement					
Residence hall	1517	6	<.001	52	<.001
Fraternity/Sorority	194	13		29	
House/Apartment	1737	13		14	
Other	158	14		24	
GPA					
Below 2.5	168	14	.001	14	.102
2.5 to 2.9	514	13		24	
3.0 to 3.4	1394	12		21	
3.5 or higher	1492	8		33	
Sexual identity					
Heterosexual	3454	10	<.001	26	.726
Gay/Lesbian/Bisexual	117	25		29	
Highest educational level of parents					
HS or below	373	11	.659	23	.414
Associate's degree	243	8		10	
Bachelor's degree	1050	10		26	
Advanced degree	1901	11		27	
Hours per week spent at parties					
None	874	3	<.001	21	.022
1 to 4	1550	9		20	
5 to 9	867	15		23	
10 or more	287	26		39	

* Vs. initiation in college. Results based on 355 students who report having used ecstasy.

3. Results

Overall, 10% of respondents reported having used ecstasy in their lifetime, while 7% had used it within the past year, and 3% within the past month. Among the extensive list of 15 illegal substances we asked about, only alcohol and marijuana were more widely used. As illustrated in Table 1, bivariate chi-square results indicated that students with lower grade point averages (GPA) were more likely to have ever tried ecstasy ($p = .001$) and hours spent weekly at parties was also highly related, with only 3% of those never attending parties reporting some ecstasy use, compared to 26% of those spending 10 or more hours at parties each week ($p < .001$). Men and women were equally likely to have ever used ecstasy and White students were more likely to report lifetime ecstasy use than African American or Asian students.

Another consistent association was found with sexual identity. Those who identified themselves as gay, lesbian, or bisexual were more likely to have used ecstasy, whether lifetime, past year, or past month was considered. Sexual identity was strongly related to lifetime use, with 25% of those who self-identified as gay, lesbian, or bisexual having used ecstasy, compared to 10% of heterosexuals ($p < .001$).

Among the 355 students who reported having ever used ecstasy, we also considered their age at first use (Table 1). Class year was strongly associated with time of initiation, with 70% of first-year students (freshmen) reporting high school use, compared to only 11% of seniors. A higher percentage of lifetime users living in residence halls reported some high school use than did lifetime users in other living arrangements, but because most residence hall occupants are freshmen; this is largely attributable to the class year (cohort) trend.

We ran three logistic regression models to examine predictors of lifetime, past year, and past month ecstasy use respectively (Table 2). In each model, we included sex, race/ethnicity, class year, living arrangement, GPA, sexual identity, number of sexual partners in the past year, parents' education, and hours per week spent at parties. In the past year and past month ecstasy use models, we additionally included a dichotomous (yes/no) variable for any pre-college ecstasy use. Because pre-college ecstasy use implies lifetime use, we did not include this variable in the lifetime ecstasy use model.

Sex and parents' education (the maximum education attained by either parent) were unrelated to ecstasy use in all three models. We did note that African American students tended to be less likely to have used ecstasy in all three time frames (significantly so, for lifetime use), but the race or ethnicity variable, when taken as a whole, was not significant in any model. Lifetime use differences by race were also reflected in the unadjusted odds ratios (data not shown), but after controlling for other important variables (those included in Table 2), this diminished trend was no longer statistically significant. Thus, while our results hint at possible associations with race or ethnicity, we are reluctant to give much weight to the two significant race contrasts we observed in our models.

Students with a GPA of 3.5 or higher were consistently and substantially less likely to have used ecstasy (compared to those with GPAs below 2.5), though for past month ecstasy use this difference was only marginally significant ($p = .08$). In all three time frames, odds ratios reflect a clear trend across

Table 2
Predictors of ecstasy use in lifetime, past year, and past month[1]

Characteristic	Lifetime OR	Past year OR	Past month OR
Sex			
Male	–	–	–
Female	0.89	0.92	1.12
Race			
White	–	–	–
Asian	1.08	1.53	0.99
African American	0.35*	0.47	0.23
Other	1.00	0.93	0.71
Class year			
Freshman	–	–	–
Sophomore	1.01	0.80	0.73
Junior	0.93	0.84	0.56
Senior	1.14	0.81	0.76
Living arrangement			
Residence hall	–	–	–
Fraternity/Sorority	1.27	1.67	0.93
House/Apartment	1.56*	2.24**	1.72
Other	2.51**	2.84**	4.93**
Grade point average			
Below 2.5	–	–	–
2.5 to 2.9	0.84	0.65	0.74
3.0 to 3.4	0.66	0.48*	0.65
3.5 or higher	0.47**	0.31***	0.43
Sexual orientation			
Heterosexual	–	–	–
Gay/Lesbian/Bisexual	2.64***	2.71**	1.98
Past year # sexual partners			
None	–	–	–
One	2.07***	1.98**	1.79
Two	4.93***	4.66***	4.25***
Three	3.53***	3.28***	4.64***
Four	8.60***	5.25***	5.03**
Five or more	9.33***	5.44***	4.59**
Highest educational level of parents			
HS or below	–	–	–
Associate's degree	0.68	0.70	0.30
Bachelor's degree	0.93	1.56	1.16
Advanced degree	1.00	1.44	0.96
Hours per week spent at parties			
None	–	–	–
1 to 4	2.45***	2.85***	2.41
5 to 9	3.79***	4.09***	4.78**
10 or more	6.24***	5.30***	4.14*
Pre-college ecstasy use			
No		–	–
Yes		14.40***	7.11***

– reference category.
* $p < .05$.
** $p < .01$.
*** $p < .001$.
[1] Odds ratios are adjusted for all other predictors in the model.

the four GPA categories, with higher GPA correlating with a decrease in ecstasy use. Not surprisingly, pre-college ecstasy use was related to ecstasy use in college; students who used the drug in high school were more than seven times as likely to report ecstasy use in the previous month.

Sexual identity and the number of sexual partners within the previous year were predictive of lifetime, annual and monthly ecstasy use. Students with five or more sexual partners in the previous year were more than nine times as likely to report lifetime ecstasy use when compared to students with no sexual partners; these students were more than four times as likely to have used ecstasy in the past month. Lesbian, gay, and bisexual students were also more likely to report lifetime, annual, and past month ecstasy use than their heterosexual counterparts. Lesbian, gay, and bisexual students were more than twice as likely to have used ecstasy in the past year as heterosexual students.

Table 3
Prevalence of ecstasy use in the past month, by other substance use variables. Percentages using ecstasy are within each level or category of other substance use

	n	%	% using ecstasy in past month*	χ^2 (df) *p*-value
Cigarettes per day				
None	2770	77	1	174.1(3)
< 1	405	11	5	< .001
1 to 5	235	7	13	
About ½ pack or more	188	5	11	
Alcohol in past month				
Never	868	25	0	65.7(5)
1–2 times	695	20	2	< .001
3–5 times	718	20	2	
6–9 times	627	18	4	
10–19 times	485	14	6	
20+ times	114	3	9	
Drinks per week				
None	1146	32	0	48.4(4)
1 or 2	440	12	2	< .001
3 to 6	642	18	4	
7 to 20	752	21	5	
21 or more	626	17	3	
Binge drinking in past 2 weeks				
No	1761	51	1	45.9(1)
Yes	1708	49	4	< .001
Marijuana use in past month				
No	2841	80	1	233.7(1)
Yes	718	20	11	< .001
Hours per week spent attending parties				
None	874	24	1	48.6(3)
1 to 4	1550	43	2	< .001
5 to 9	867	24	4	
10 or more	287	8	7	

* Percentage within each subgroup or subcategory of other substance use; for instance, 13% of students who smoked 1 to 5 cigarettes daily had used ecstasy in the past month.

In identifying subgroups at particular risk for ecstasy use (Table 3), we found that other substance use was associated with ecstasy use. As the number of times a student had used alcohol in the past month increased, the percentage using ecstasy consistently increased. Students who reported binge drinking within the past two weeks were more likely to report past-month ecstasy use (4% vs. 1% of those who had not binged). Among those who had used marijuana in the past month, 11% had also used ecstasy, compared to only 1% of those who had not used marijuana.

4. Discussion

Beginning in 1996, MDMA use began to expand rapidly in the United States, particularly in younger populations (Johnston et al., 2001a). Although MDMA is used by all ages, use by adolescents and young adults has increased sharply in recent years.

Most certainly our findings regarding sexual identity have implications for drug prevention programs and suggest it would be beneficial to examine other drug use and risk factors among gay, lesbian, and bisexual collegians (McCabe, Boyd, Hughs & d'Arcy, in press). We found that sexual identity was a strong correlate of ecstasy use. For each time frame (lifetime, annual, or past month), students who self-identified as gay, lesbian, or bisexual were more likely to have used ecstasy. The relationship between ecstasy use and sexual identity appears important, particularly since past research has shown mixed results regarding drug use and sexual identity among college students. Pope and colleagues (2001), using 1999 data from a longitudinal sample of one college population (n = 796), found that students who reported homosexual activity were more likely to report drug use. DeBord, Wood, Sher, and Good (1998) found no significant differences in drug involvement between 156 heterosexual students and 39 gay, lesbian, and bisexual students in a single institutional study. However, neither of these studies included large samples and neither examined the relationship between sexual identity and ecstasy use.

Pope and colleagues (2001) reported that in their 1999 college sample, lifetime drug users (any drug) were significantly more likely to report having homosexual activity to orgasm in their lifetimes (78% of drug users vs. 44% of non drug users; $p < .0001$) while Strote and colleagues (2002) found that undergraduate students who used ecstasy in the previous year were more likely to have two or more sex partners in the previous month (Adj. OR = 1.69; p = .0009). When considering the findings of Strote and colleagues, we must also consider that ecstasy is characterized as a "club" or party drug and has a reputation for sexual enhancement; it is possible that the number of sexual partners in the previous month was a consequence of annual ecstasy use and not necessarily a risky behavior that predicts ecstasy use. In our 2001 sample, however, we also found

evidence that ecstasy use was associated with having multiple sex partners. After adjusting for all other predictors in our model, we found that as the number of sex partners increased, so too did the odds of lifetime, annual, and 30-day ecstasy use.

Consistent with previous research, undergraduates in our sample who reported past 30-day ecstasy use were more likely to smoke cigarettes, binge drink, use marijuana and party often (Strote et al., 2002). These findings are consistent with other reports indicating that ecstasy users are disproportionately polydrug users, often combining other "club drugs" (e.g. ketamine, GHB, etc.) with ecstasy in a single evening (Drug Abuse Warning Network, December, 2000). Again, these findings have implications for screening as well as drug prevention efforts. Clinicians may decide to more thoroughly screen students who report the use of legal drugs; these students appear more likely to also use ecstasy.

Our data are consistent with recent trends reported by other researchers (Johnston et al., 2001b; Strote et al., 2002); ecstasy use continues to increase among college students. When the web version of the Student Life Survey was given in 1999, approximately 4% of the students reported annual ecstasy use; by 2001 there was a statistically significant increase with 7% of students reporting annual ecstasy use. We also found that in 2001 approximately 10% of our undergraduates reported lifetime ecstasy use, with notable differences in high school ecstasy use by class year. Seventy-one percent of freshman currently using ecstasy had used ecstasy in high school, as contrasted with only 11% of seniors who reported use in high school. Our data confirmed that ecstasy is second only to marijuana as the most frequently used illicit drug among our sample of undergraduate students. Our results are in line with the recent trends documented in the *Monitoring the Future* study (Johnston et al., 2001a, 2001b); increasingly, young people are initiating ecstasy use while in high school. It is interesting that we found no relationship between sexual identity, low GPA, and high school ecstasy use although there was a clear relationship while in college. Again, these relationships may change as more young people initiate ecstasy use in high school.

We found that academic achievement and class year appeared related to ecstasy use and in the logistic regression analysis, seniors appeared significantly more likely than freshmen to have ever used ecstasy. However, class year was unrelated to use when considering only the past year or the past month. We conclude that seniors are more likely to have tried ecstasy simply because they have lived longer and have had greater opportunity, and not because this cohort is more inclined to ecstasy use. We also found significant differences between ecstasy use and academic achievement, as measured by grade point average, which was not been examined in previous research (i.e. Strote et al., 2002). In part, we attribute the differences between our findings and those of other researchers to the variation in the measurement of academic achievement as well as several other factors that were differentially included in the two studies.

It is important to note that our logistic regression results were adjusted for the hours per week spent at parties (one of the strongest predictors in our model). Though it may not be surprising that additional time spent at parties is related to increased ecstasy use, the inclusion of this variable strengthens the above results. Ecstasy is often used at parties or raves, so that characteristics associated with "partying" generally will tend to be associated with ecstasy use.

We feel that our results do not merely identify students who have had more exposure to ecstasy, but more accurately identify factors involved in a decision to use the drug. Most students attend parties: over 75% of our sample reported spending at least one hour per week at parties, with roughly a third spending five or more hours weekly. Preventing exposure to ecstasy may not be possible for large segments of the student population; thus, knowing the factors that encourage ecstasy use *regardless* of level of exposure may benefit prevention efforts.

Our findings must be viewed in the context of certain study limitations. One of the most notable is that we utilized a cross-sectional design with a sample drawn from one university; thus, generalizablity is limited. Further, it is possible that fielding the survey during the end of the winter semester negatively affected our response rate, although by doing it at this time, we were able to avoid the changes in drug use, binge drinking, and partying often occurring during the University's spring break. The survey took 20 min to complete and some students wrote to tell us that it was too long; we may have lost respondents who simply did not want to spend time answering a survey. We were forced to balance the length of the survey with our need for data. And finally, response rate differed by mode, although overall a response rate of 52% was achieved. The 52% percent rate is consistent with other national surveys of college students (Strote et al., 2002). Despite these limitations, it is apparent that ecstasy use among our respondents is similar in many ways to that of four-year college students in the US (Johnston et al., 2001a; Strote et al., 2002) and warrants further research.

The increased use of ecstasy among college students comes at a time when we are discovering many negative consequences associated with the drug (Morgan, 2000; Teter & Guthrie, 2001). We found that ecstasy users in our sample were more likely to have multiple sex partners, binge drink and smoke cigarettes and marijuana. Since multiple sex partners is associated with increased rates of sexually transmitted diseases and binge drinking is associated with increased rates of injury, we believe college administrators, health professionals and parents are rightfully concerned. Our findings indicate the need for further research in order to develop better drug prevention programs–in high schools and colleges–specifically aimed at decreasing ecstasy use.

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References

Boot, B. P., McGregor, I. S., & Hall, W. (2000). MDMA (Ecstasy) neurotoxicity: Assessing and communicating the risks. *Lancet*, *355* (9217), 1818–1821.

Conner, M., & Sherlock, K. (1998). Psychosocial determinants of ecstasy use in young people in the UK. *British Journal of Health Psychology*, *3* (4), 23.

DeBord, K. A., Wood, P. K., Sher, K. J., & Good, G. E. (1998). The relevance of sexual orientation to substance abuse and psychological distress among college students. *Journal of College Student Development*, *39*, 157–168.

Drug Abuse Warning Network (December, 2000). *Club drugs: the DAWN report*. Rockville, MD: Office of Applied Studies, Substance Abuse and Mental Health Service Administration.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2000). Monitoring the future: National survey results on drug use, 1975–2000 (Vol. II, NIH Publication No. 00-4803). Bethesda, MD: National Institute on Drug Abuse.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2001a). *Monitoring the future: National survey results on drug use, 1975–200 (Vol. I and II, NIH Publication No. 01–4925)*. Bethesda, MD: National Institute on Drug Abuse.

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2001b). Rise in ecstasy use among American teens begins to slow. Ann Arbor, MI: University of Michigan News and Information Services. [On-line. Available: www.monitoringthefuture.org; accessed 3/12/2002.]

McCabe, S. E., Boyd, C. J., Hughes, T., & d'Arcy, H. (in press). Sexual identity and substance use among undergraduate students. *Substance Abuse*.

McCabe, S. E., Boyd, C. J., Couper, M., Crawford, S., & d'Arcy, H. (2002). Mode effects for collecting alcohol and other drug use data: Web and U.S. Mail. *Journal on Studies of Alcohol*, *63* (6), 755–761.

Morgan, M. J. (2000). Memory deficits associated with recreational use of ecstasy. *Psychopharmacology*, *141* (1), 30–36.

Pope, H. G., Ionescu-Pioggia, M., & Pope, K. (2001). Drug use and life style among college undergraduates: A 30-year longitudinal study. *American Journal of Psychiatry*, *158* (8), 1519–1521.

Presley, C. A., Meilman, P. W., & Cashin, J. R. (1996). *Alcohol and drugs on American college campuses: Use, consequences, and perceptions of the campus environment (vol. IV: 1992–94)*. Carbondale, IL: Core Institute, Southern Illinois University.

Strote, J., Lee, J. E., & Wechsler, H. (2002). Increasing MDMA use among college students: Results from a national survey. *Journal of Adolescent Health*, *30*, 64–71.

Teter, C., & Guthrie, S. (2001). A comprehensive review of MDMA and GHB: Two common club drugs. *Pharmacotherapy*, *21* (12), 1486–1513.

Wechsler, H., Davenport, A., Dowdall, G., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of the American Medical Association*, *272* (21), 1672–1677.

Zemishlany, Z., Aizenberg, D., & Weizman, A. (2001). Subjective effects of MDMA (Ecstasy) on human sexual function. *European Psychiatry: the Journal of the Association of European Psychiatrists*, *16* (2), 127–130.